#19/Response w/extra 6/6/02

PATENT

ATTORNEY DOCKET NO.: AGX-37-RCE-CPA

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application)
Shooshtarian, et al.) Examiner: Hsein-Ming Lee
)
Serial No.: 09/527,873) Art Unit: 2823
)
Filed: March 17, 2000) Dept. Acct. No.: 04-1403
)
Title: Localized Heating and)
Cooling of Substrates)

Commissioner for Patents
Washington, D.C. 20231

RESPONSE

Dear Sir:

In response to the Office Action dated January 30, 2002 and in conjunction with the Continued Prosecution Application (CPA) submitted herewith, favorable reconsideration and allowance of the present application is respectfully requested.

Currently, claims 1-2 and 4-13, including independent claim 1, remain pending in the present application. Independent claim 1 is generally directed to a method of heat treating a semiconductor wafer placed in a thermal processing chamber. While present within the thermal processing chamber, the wafer is subjected to a predetermined heating cycle that can include various heating and/or cooling stages. For example, the predetermined heating cycle includes at least one heating stage in which a plurality of lamps heat the wafer. The method of claim 1 also includes providing a gas to selectively control the temperature of at least one of a plurality of localized regions of

the wafer to minimize temperature deviation of the localized region from a predetermined temperature.

Various advantages and benefits are achieved through this method. For instance, the temperature profile of the semiconductor wafer can be maintained at a substantially uniform temperature throughout the entire predetermined heating cycle, which may include ramp-up, steady state, and ramp-down stages. Moreover, by maintaining the temperature profile of the wafer at substantially uniform temperatures, the resulting method can be used, for example, to effectively anneal a silicon wafer and/or thin films or layers formed thereon, as well as to form ultra-thin coatings and films on the wafer.

In the Office Action, independent claim 1 was rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 5,926,742 to Thakur, et al. Thakur, et al. is directed to a method in which high intensity heat radiation is used as a means to control and correct warpage and related deformation arising from semiconductor fabrication processes. For instance, Thakur, et al. states that any transient heating apparatus having individually controllable heating zones or elements may be used to perform the shape correction. (Col 5, lines 52-56). For example, as shown in Fig. 4, Thakur, et al. describes a RTP chamber 14 that contains a plurality of lamps 18. In addition, the chamber 14 also contains a gas injection head 22 for injecting gases into the chamber whereby various processing steps may be performed therein. (Col 6, lines 8-12).

Nevertheless, contrary to claim 1, the method described in Thakur, et al. simply does not utilize a gas to selectively control the temperature of at least one of the localized regions of the semiconductor wafer to minimize temperature deviation from a

predetermined temperature. In particular, Thakur, et al. teaches that various lamps 18 can be used to heat individual zones of the wafer. When utilized, the gas, as shown in Fig. 4, enters the injection head 22 and is dispersed to the entire wafer. There is simply no teaching of a device that enable the gas to be used to selectively control localized regions of the wafer. To the contrary, the gas shown in Fig. 4 of Thakur, et al. would be simultaneously applied to the entire wafer. As a result, it would be unlikely that a localized temperature deviation could be corrected using the gas in Thakur, et al. Thus, at least because the gas does not provide selective control over the temperature of a localized region, Applicants respectfully submit that independent claim 1 patentably defines over Thakur, et al.

Further, in the Office Action, independent claim 1 was also rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,997,175 to Champetier, et al. in view of U.S. Patent No. 5,881,208 to Geyling, et al. However, Applicants respectfully submit that Champetier, et al. is not available as prior art to the present application.

For instance, under the provisions of recently amended 35 U.S.C. §103(c), a patent that qualified as prior art only under §102(e), (f), or (g) is no longer available as prior art if the patent and the claimed invention were, at the time the invention was made, subject to an obligation of assignment to the same person. This addition to §103(c) applies to any original application filed on or after Nov. 29, 1999, including continued prosecution applications filed under 37 C.F.R. §1.53(d). Further, as stated above, the present Response is being submitted herewith in conjunction with a

Continued Prosecution Application (CPA) pursuant to 37 C.F.R. §1.53(d), which is proper because the filing date of the present application is prior to May 29, 2000.

In the instant case, Champetier, et al. and the present application were both subject to assignment to Steag RTP Systems, Inc.[1] Specifically, the files of the present application refer to an assignment recorded in the PTO at Reel and Frame Nos. 010987/0195 to Steag RTP Systems, Inc. Likewise, Champetier, et al. was also formally assigned to Steag RTP Systems, Inc. on May 13, 1999, such assignment being recorded in the PTO at Reel and Frame Nos. 010007/0611. Accordingly, Applicants respectfully submit that Champetier, et al. is no longer available as prior art to the present application under §102(e)/103.

Furthermore, as discussed in previous Responses, Geyling, et al. (which was previously cited in conjunction with Champetier, et al.) fails to disclose or suggest various limitations of independent claim 1. Accordingly, for at least the reasons set forth above, Applicants respectfully submits that the independent claim 1 patentably defines over the above-cited references.

In addition, the above-cited references were also combined to reject dependent claims 2 and 4-13. Applicants respectfully submit, however, that at least for the reasons indicated above relating to corresponding independent claim 1, claims 2 and 4-13 patentably define over the references cited. However, Applicants also note that the patentability of dependent claims 2 and 4-13 certainly does not hinge on the patentability of independent claim 1. In particular, it is believed that these claims

---

[1] Champetier, et al. was originally assigned to AG Associates, who was later purchased by Steag RTP Systems, Inc.

possess features that are independently patentable, regardless of the patentably of claim 1.

In summary, it is respectfully submitted that the claims as presently amended are patentably distinct over the prior art of record. Thus, it is submitted that the present application is in complete condition for allowance and favorable action, therefore, is respectfully requested. Examiner Lee is invited and encouraged to telephone the undersigned at her convenience should any issues remain after consideration of the present response.

Please charge any additional fees required by this Response to Deposit Account No. 04-1403.

Respectfully submitted,

DORITY & MANNING, P.A.

Jason W. Johnston
Registration No.: 45,675

DORITY & MANNING, P.A.
P.O. Box 1449
Greenville, SC 29602-1449
Phone: (864) 271-1592
Facsimile: (864) 233-7342

Date: 5/30/02